

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference C02019W0 | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/EP2003/006287 | International filing date (day/month/year) 14 June 2003 (14.06.2003) | Priority date (day/month/year) 29 June 2002 (29.06.2002) |
| International Patent Classification (IPC) or national classification and IPC C07D 285/14, 417/14, 513/04, H05B 33/14, H01L 51/30 | | |
| Applicant COVION ORGANIC SEMICONDUCTORS GMBH | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

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| Date of submission of the demand 04 December 2003 (04.12.2003) | Date of completion of this report 29 November 2004 (29.11.2004) |
| Name and mailing address of the IPEA/EP | Authorized officer |
| Facsimile No. | Telephone No. |

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International application No.

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I. Basis of the report

1. With regard to the elements of the international application:*

 the international application as originally filed the description:pages _____ 1-28 _____, as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____ the claims:pages _____ , as originally filed
pages _____ , as amended (together with any statement under Article 19
pages _____ , filed with the demand
pages _____ 1-10 _____, filed with the letter of 11 October 2004 (11.10.2004) the drawings:pages _____ 1/4-4/4 _____, as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____ the sequence listing part of the description:pages _____ , as originally filed
pages _____ , filed with the demand
pages _____ , filed with the letter of _____2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is: the language of a translation furnished for the purposes of international search (under Rule 23.1(b)). the language of publication of the international application (under Rule 48.3(b)). the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

 contained in the international application in written form. filed together with the international application in computer readable form. furnished subsequently to this Authority in written form. furnished subsequently to this Authority in computer readable form. The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished. The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.4. The amendments have resulted in the cancellation of: the description, pages _____ the claims, Nos. _____ the drawings, sheets/fig _____5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | | |
|-------------------------------|--------|-----------------|-----|
| Novelty (N) | Claims | 1, 2, 4, 10, 11 | YES |
| | Claims | 3, 5, 6-9 | NO |
| Inventive step (IS) | Claims | | YES |
| | Claims | 1-10 | NO |
| Industrial applicability (IA) | Claims | 1-10 | YES |
| | Claims | | NO |

2. Citations and explanations

The amended claims appear to comply with the requirements of PCT Article 19(2).

The following documents are considered relevant prior art:

- (A) TETRAHEDRON, 1997, 53 (29), pages 10169-10178
- (B) PATENT ABSTRACTS OF JAPAN Vol. 2000, No. 21. 3 August 2001 & JP 2001 097949 A
- (C) JP 2002 069044 A
- (D) JOURNAL OF POLYMER SCIENCE, 2002, 40 (2), pages 251-261
- (E) CHEMISTRY - A EUROPEAN JOURNAL, 1998, 4 (7), pages 1235-1243
- (F) WO 00 46321 A
- (G) SYNTHETIC METALS, 2001, 119, pages 527-528
- (H) CHEMISTRY OF MATERIALS, 1996, 8 (2), pages 570-578
- (J) PATENT ABSTRACTS OF JAPAN Vol. 2000, No. 13, 5 February 2001 & JP 2000 282024 A
- (K) PATENT ABSTRACTS OF JAPAN Vol. 017, No. 678 (C-1141) & JP 05 222361 A
- (L) PATENT ABSTRACTS OF JAPAN Vol. 2003, No. 08 & JP 2003 104976 A
- (M) US 2003/099785 A1

Documents (L) and (M), which were published after the priority date of the present application, are not being considered in the present report for the time being.

Novelty

The amended claims appear novel within the meaning of PCT Article 33(2) with respect to documents (C) to (K). However, documents (A) and (B) disclose specific compounds that apparently anticipate the subject matter of claim 3 (compound A-11 in document (B)), claims 5 and 6 (compound 6e in document (A)) and claims 7 and 8. Therefore, only claims 1, 2, 4, 9 and 10 appear to satisfy the requirements of PCT Article 33(2).

Inventive Step

The present application apparently addresses the problem of providing further benzothiadiazole derivatives that are more efficient in electroluminescent and/or electro-phosphorescent devices.

Since documents (A) and (B) in particular disclose compounds that fall within the scope of the present claims and are well-suited for electroluminescent devices, an inventive step within the meaning of PCT Article 33(3) can be acknowledged for the subject matter of the application only if said subject matter results in an unexpected improvement over the respective closest prior art. However, an unexpected improvement such as this was demonstrated only for one single compound, namely for example R12 with formula (II), in which n=3, with respect to a comparative compound of formula (II), in which n=2. Based on this test, an inventive step can be acknowledged for the compounds of formula (II) in which n=3. However, this acknowledgement cannot be extended to all of the other formula types. This is true in particular because the comparative compound

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cannot be considered the closest prior art for the other types. Moreover, there appears to be a question as to unity of invention, since the inventiveness of the compounds of formula (II) appears to be based on the third linear aryl group, i.e. on n=3. There do not appear to be any novel and inventive structural features that are common to all of the claimed compounds at this time.